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SMALL-POX AND VACCINATION

A Popular Treatise

By

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DEPARTMENT OF HEALTH
CANADA

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SMALL-POX

The word "pox" comes from the old Saxon word "pocca," meaning a pouch or bag.

Symptoms

Small-pox is an infectious disease which begins, as a rule, with headache, backache, chills and vomiting. In children there are sometimes convulsions and in adults delirium. Following the chill there is fever which gradually increases until the third day when it rapidly falls.

The Initial Rash

During this period initial rashes, which are often overlooked, make their appearance. They are of two distinct types, one which resembles measles and the other scarlet fever.

The True Rash

As the fever falls the true small-pox rash appears. It consists of bright red spots called "macules" which appear first upon the forehead and wrists and then upon other parts of the body, such as the scalp, back, breast, arms, abdomen and legs. A tingling or itching accompanies the eruption at this stage. In about two days the spots become more prominent and seem to push through the skin and they are then known as "papules". To the finger they feel like tiny shot imbedded in the skin. These papules become filled with clear fluid, when they are known as "vesicles". The clear fluid gradually becomes thick and opaque and the "vesicles" are then known as "pustules".

Around the "pustule" there is a narrow red ring or "areola". As the rash comes out the fever and other symptoms lessen and the patient feels quite comfortable.

Scarring

The pustular stage is complete at the end of the eighth day and from this time on the pustules begin to dry up, forming a tough, flat, brown scab or crust which eventually falls out after about the twenty-first to twenty-eighth day, leaving a sunken red scar which gradually becomes white.

Types of Small-pox

When the pustules are only a few in number they are said to be "discrete" and the case is a mild one. When the pustules are so numerous that they run together forming pockets of pus the case is said to be "confluent" and is a very severe one.

There are two other severe types of small-pox, known as "hemorrhagic pustular" and "purpuric" small-pox. In the former bleeding occurs into the papule, vesicle or pustule. The dark color present, which is due to the bleeding, has given the name black small-pox to this type. In the "purpuric" type a dark red rash appears on the body and extremities. The whites of the eyes, gums, tonsils, throat and nose are swollen and "hemorrhagic". Pustules do not appear. Death occurs very early in this type of the disease. The child in the womb may suffer from small-pox, if the mother has the disease, and be born in full eruption.

Small-pox Without a Rash

Occasionally a case of small-pox without eruption is seen. In this type there is headache, pain in the back, fever and nausea. These symptoms last two or three days and then disappear. In these cases the initial rash may appear but the typical eruption of small-pox is absent. These cases are infectious and may transmit the disease in a severe form.

Mortality

The mortality varies with the type of the disease. The hemorrhagic form is almost invariably fatal. The death rate in the confluent form is also high. In the discrete form the mortality is low. The mortality in children from all types is high.



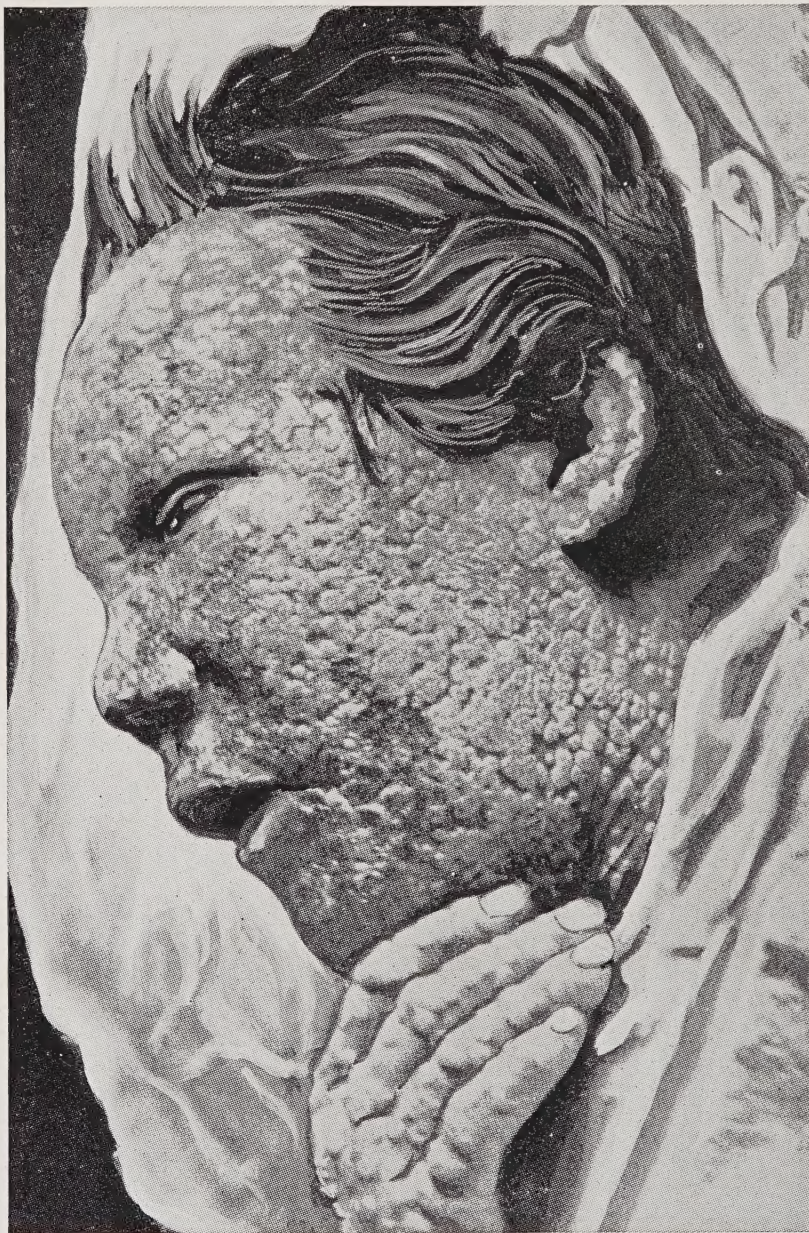
Courtesy of Welch & Schamberg

MILD DISCRETE VARIETY OF SMALL-POX

SEVENTH DAY OF ERUPTION

Incidence

The incidence of small-pox, as well as the type, is dependent upon the number of unprotected people in the community. The disease is kept alive by sporadic cases in unvaccinated members of the community.



CONFLUENT SMALL-POX

Courtesy of Ricketts & Byles

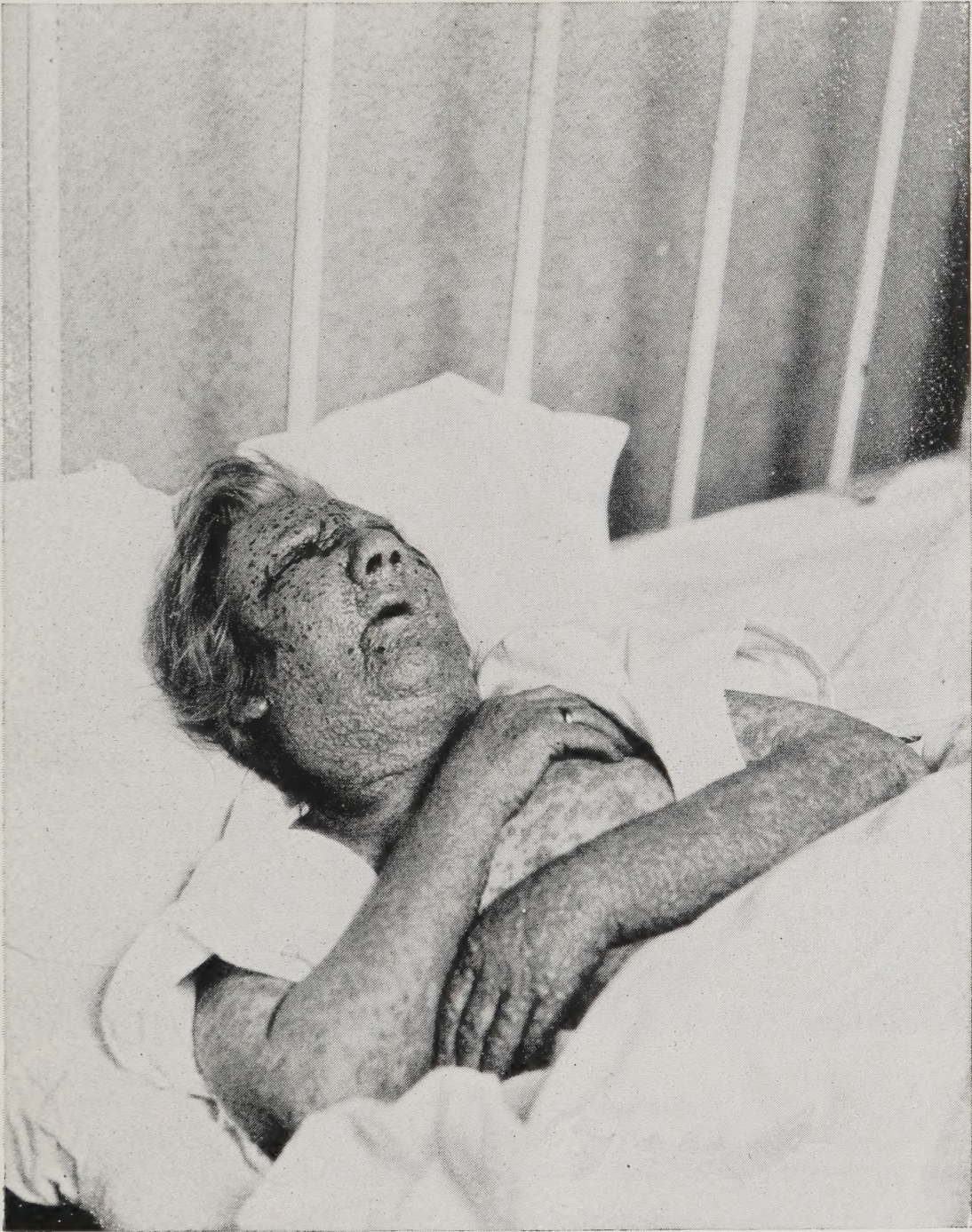
A CONFLUENT PUSTULAR ERUPTION, VIRULENT IN TYPE

History

There is in India a tradition that small-pox existed among the Brahmins since the beginning of time and that the inhabitants of India built temples and shrines and offered sacrifices to the goddess of small-pox to grant them protection from the disease.

Modern writers tell us that the disease existed in China a thousand years before Christianity and that it was believed by the Chinese that a goddess presided over the disease as in India and, like the Brahmins, the Chinese built temples and propitiated the goddess by sacrifices.

It is probable that small-pox existed among the ancient Romans and Greeks, although the evidence is not conclusive.

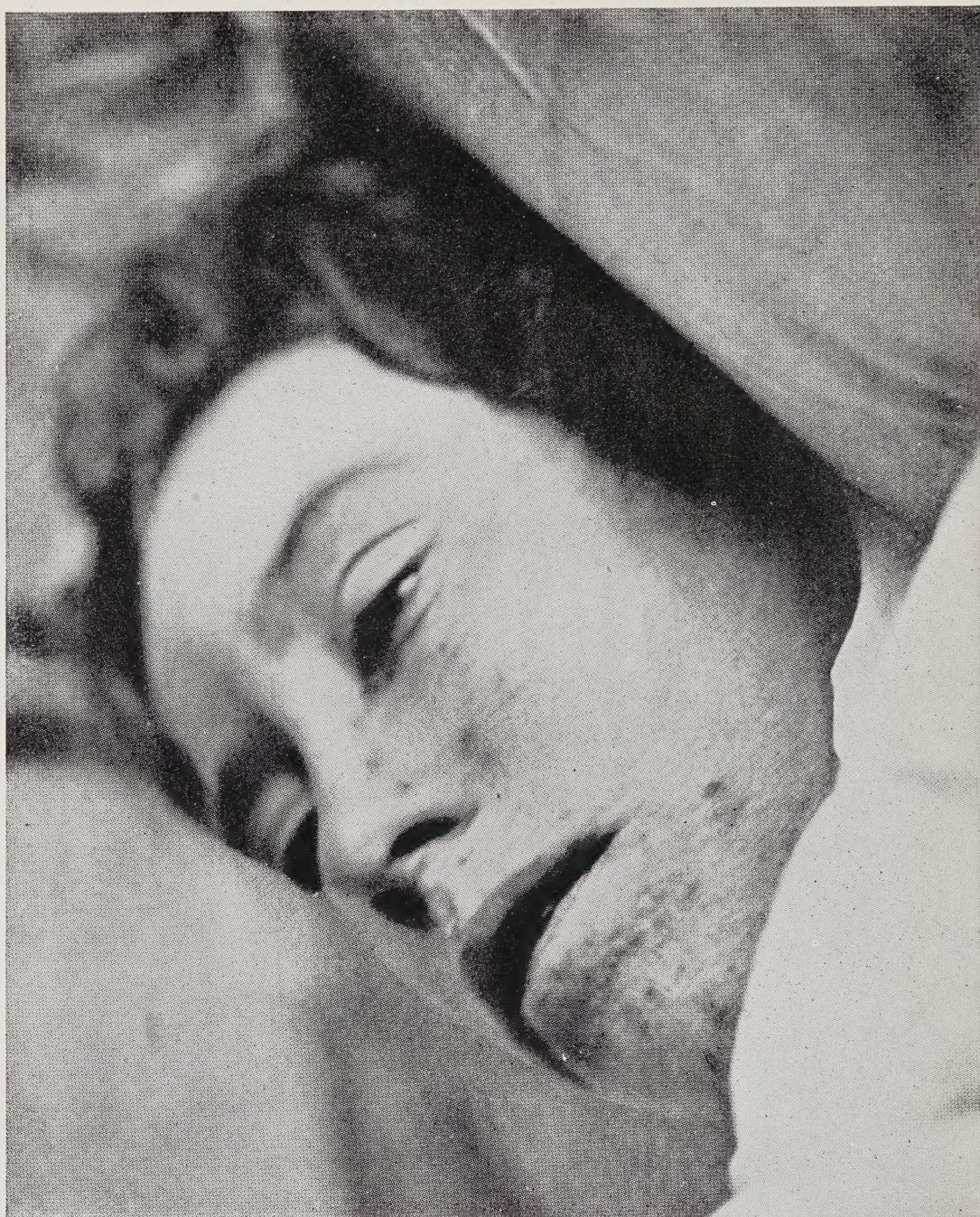


BLACK SMALL-POX

Courtesy of Dr. Fred. Adams.

NOTE HEMMORHAGE INTO PUSTULES ON FACE

In the early Christian era the first mention is made of the disease by Bishop Marius of Lausanne in the fifth century. Writing in the year 570 A.D. he described a vast epidemic that



Courtesy of Ricketts & Byles

TOXIC OR HEMMORHAGIC SMALL-POX

NOTE THE DROOPING EYELIDS, THE FULL AND PARTED LIPS, OBLITERATION OF LINES OF EXPRESSION, AND ABSENCE OF PUSTULES

swept over Italy and France and a few years later, 582 A.D. Bishop Gregory of Tours speaks of the disease. He says that it is characterized by fever, pain in the back and an eruption of

pustules most marked on the face, hands and feet. In the seventh century the disease found its way into the British Islands.

The first clear description of small-pox was by a physician who was known as "Isaac the Jew", who lived in the ninth century. The clearest description of the disease in those days was by Rhazes, an Arabian physician, who was the first to point out the fact that small-pox was a disease of children. In the British museum there are manuscripts from the tenth and eleventh century which describe small-pox. In one of these, which is known as the "Harleian" manuscript, there is a Saxon prayer which runs thus: "Gaskyldoth me vid de lathan Pocces", which means "shield me against the hideous pocks". In the thirteenth century a very learned physician, John of Gaddesden, recognized the contagiousness of the disease. In the year 1578 Cardinal Wolsey was informed that Henry VIII was leaving Wallingford on account of the prevalence of "small pokkes".

Small-pox Among Royalty

That small-pox was no respecter of persons is shown by the striking array of notables who died of the dread disease. Among those we find William II of Orange; Emperor Joseph I. of Germany; Peter II, Emperor of Russia; the Prince of Prussia; Louis XV of France; two children of Charles I of England; a son of James II of England, also his daughter, Queen Mary, and her uncle, the Duke of Gloucester; the son of Louis XIV; and Louis, Duke of Burgundy. Many other notables suffered from the disease but escaped death, as for example, Queen Anne of England; Peter III of Russia; Louis XIV of France; William III; and Queen Maria Theresa of Austria.

We can judge of the prevalence of the disease from the words of Ben Johnson who wrote in 1637:—

"Envious and foul disease, could there not be
One beauty in our age, and free from thee!"

and again from the words of George Bell of Edinburgh who wrote: "The small-pox ever since its introduction in Europe, more than a thousand years ago, has descended with undiminished violence from generation to generation"; and again in the words of Dr. Lettson, written in 1801: "In reflecting upon its ravages the mind revolts with horror."

Small-pox a Disease of Childhood

Small-pox before the days of vaccination was chiefly a disease of children and the adult population consisted mainly of survivors of a childhood attack. In those days in Europe there were 400,000 small-pox deaths annually.

Small-pox in Canada Among the Indians

While the recital of the history of small-pox in the early days of the race and through the middle ages is, no doubt, of very great interest to us, let us follow the progress of the disease in Canada since it was first introduced by the early settlers and possibly there we may find something of especial significance for us Canadians. We find that small-pox first appeared in Canada in the year 1635, eighteen years after the first settler arrived in the country. Although adventurers had made voyages to Canada for the purpose of trade with the Indians many years before, the first immigrant arrived only in the year 1617. At this early date, 1635, the disease appeared among the Montagnais Indians who inhabited the region of Tadoussac on the banks of the St. Lawrence. From this time on the story of small-pox in Canada is one of widespread destruction. Writing at this time, 1635, the early chronicler in speaking of the ravages of the disease among the Indians says: "All these poor people have been much inconvenienced by it, particularly during the autumn as much in their fishing as in their harvesting. Many crops are lying beneath the snow; a large number of persons are dead."

By the year 1639 the disease had spread as far as Sillery and Three Rivers, on the banks of the St. Lawrence west of Quebec, and in the year 1640 it had reached as far west as Georgian Bay. The greatest sufferers were the Montagnais, Algonquins and Hurons. The Indians, realizing at this time that the disease was given them by the early settlers, resolved upon their massacre. A general council was held and the plurality of votes were in favour of death. The chronicler of the time says: "They no longer speak of aught else. They cry aloud that the French must be massacred. These barbarians animate one another to that effect; the death of their nearest relatives takes away their reason, and increases their rage against us so strongly in each village that the best informed can hardly believe that we can survive so horrible a storm. *They observed with some sort of*

reason that since our arrival in these lands those who had been the nearest to us had happened to be the most ruined by the disease, and that whole villages of those who had received us now appeared utterly exterminated, and certainly they said the same would be the fate of all others if the course of this misfortune were not stopped by the massacre of those who were the cause of it."

Father Ragueneau, one of the early missionaries speaking of the hostility of the Indians at this time says: "A young man forcibly seized the crucifix which I wore about my neck, takes a hatchet in his hand and says positively that I should die. He lifts the hatchet directly above the middle of my head—then uncovered—and deals his blow so steadily that Father Chaumont and I think to see at that moment what we have so long desired, (martyrdom). I know not what stopped the blow, but short of feeling the hatchet cleave a head in twain one cannot see one's self closer to death. He is fain to repeat his stroke; a woman stops his arm and seizes him."

Small-pox at this time, 1640, ravaged the whole country. Everywhere the missionaries went they found the sick, the dead and the dying. For example: "On our way to a place, we go astray unawares, and find ourselves in routes that we were not seeking. We meet two little children who are dying—prostrate near their mother, who is all in tears."; "I set foot in a poor little house where I have never entered; I find a young lad in very great danger of dying."; "I pass near a cabin where three little children are dying."

Irregular Periodicity of Disease

Before the days of vaccination the disease commonly recurred in epidemic form at irregular intervals. It took its toll of each succeeding generation of unprotected persons.

In the year 1661 it again ravaged the country, now spreading north towards Hudson Bay. The Attikamagues were the greatest sufferers. At this time the historian tells us that: "The small-pox gathered a rich harvest. It has wrought sad havoc in their villages and has carried off many men besides great numbers of woman and children and as a result their villages are nearly deserted and their fields only half tilled."

In the years 1663, 1664 and 1665 it was present among the Iroquois and swept away more than a thousand souls.

In the years 1669 and 1670 it decimated the Algonquins,

Montagnais, Papinachois and Gaspeceans. In 1671 it raged through the tribes of the north country along the banks of Lake St. John. In 1678 the "Caughnawaga" Indians, near Montreal, were visited by the disease.

In the year 1679 Count de Frontenac, the Governor of the French colony, writing to the King of France from Quebec says that "the small-pox, which is the Indian plague, desolates them to such a degree that they think no longer of meeting, n'or of wars but only bewailing the dead of whom there is already an immense number."

By the year 1700 the disease had spread from the Atlantic, in the east, to Georgian Bay, in the west, and from Hudson Bay, in the north, to the Atlantic sea-board in the south. The Indians of New France as well as those of New England were victims. The Indians were literally wiped out by the dread disease. An early historian states that small-pox is largely responsible for the disappearance of the Indians from the country.

Small-pox Among the White Settlers

If the dread scourge decimated the Indians, what of the white inhabitants of New France? Did the white people escape because of better living conditions than those of the Indians or because they had developed a racial immunity? Let us see!

Three Thousand Deaths in Quebec in 1702-1703

In the year 1702-1703 there were three thousand death among the French inhabitants of the city of Quebec. In the "History of the Hotel Dieu of Quebec" by the Abbe Casgrain we read that at that time "The mortality was so great that the priests could scarcely bury the dead, and assist the dying. Each day the bodies were brought to the church in Lower Town, or to the cathedral without any ceremony and at night they were buried together sometimes to the number of 15, 16 or 18 in one group. This continued for many months and there were more than two thousand deaths counted in the register of deaths at Quebec without speaking of the surrounding country. Never has so much suffering been seen. Everyone wept for relatives; one for a wife; another a husband; this one a brother; that one a sister; orphans wept for their fathers and mothers; everyone was in tears, and all winter the only meetings were for funerals.

Those who were not attacked fled the house of those who were, but their precautions were in vain, they were affected in their turn and died as those who were most exposed."

Eighteen Hundred Deaths in Quebec in 1732-1733

In the years 1732-1733 the French colony was again ravaged by the disease. There were counted at one time in the hospitals at Quebec two thousand patients. There were between seventeen hundred and eighteen hundred deaths.

Small-pox Reaps Big Harvest in Quebec in 1755

In the year 1755 an epidemic so widespread and terrible in its ravages swept the colony that for years afterwards that year was referred to as the year of the great small-pox epidemic. As the population increased more material was provided for the disease. The people were mowed down like grain before the reaper. After a short respite the colony was again thrown into panic by the dread scourge.

Twenty-six Hundred Patients in Quebec Hospitals in 1757

In the year 1757 Montcalm gives the number of cases of small-pox in hospitals at Quebec as 2,000 to 2,600, of whom a fifth died. This did not take into account the number of cases in the surrounding country. In this year the disease spread to Montreal where it caused many deaths. The deaths among the Indians of Canada alone at this time were so great that it cost France a million francs for medical treatment and burials.

Small-pox and War

From the period 1757 onward the country was at war and no records of small-pox are available except what we find among the troops. During the siege of Louisbourg and Quebec we read that "The troops have suffered considerably by sickness—mostly among the rangers to whom the small-pox has proved very fatal." The disease was continually present in the country and was kept alive from year to year.

Changed Outlook

To-day we have no conception of the meaning of the word "small-pox". For us the word has been robbed of its terrors and

we discuss the problem of small-pox in the community in a general and academic way, but in those days the word "small-pox" blanched the cheek and brought a look of terror to the eyes. Small-pox in those days meant death. Relentless and insatiate the disease would sweep through the community mowing down all those who had not already suffered from it; killing, maiming and leaving its victims blinded or disfigured for life. It played a part of no little importance in the political history of Canada in the early days. It stopped wars between the English and French who were struggling for possession of the country and added to the difficulties of the campaign, for the Indian warriors, who were used as mercenaries by the English and French, were decimated again and again making war impossible. Troops on the march were attacked by the disease and obliged to stop their operations. Before Louisbourg and Quebec the attacking armies were grievously handicapped by the disease. When small-pox stepped in and took charge all activities ceased and as the chronicler says: "the only meetings were for funerals." Vaccination has altered all this and forgetful or ignorant of the appalling ravages of the disease in other days, we now scarcely give the subject of small-pox a thought.

Inoculation with Small-pox as a Prevention

About this time, 1768, inoculation with small-pox was introduced. Vaccination with the matter from a small-pox vesicle was common in many European countries for a number of years. It was thought that if some of the pus from a mild case of small-pox was rubbed into the skin a mild attack of small-pox would follow. The people of those days had suffered to such an extent from the dread malady that they were willing to try anything that would protect them from the deadly form of the disease which was so prevalent. The result of this method of inoculation was not always what one expected as fatal cases developed from the inoculation of the pus from mild cases. We find reference to this method of inoculation in the press of that time, for example, the following from the Quebec Gazette of 15th September, 1768 is of interest: "Mr. Latham surgeon to the King's or (8th) 'Regiment of Foot' acquaints the inhabitants of Quebec that some days ago he inoculated some soldiers belonging to the Regiment by which means he has secured sufficient infection for those who chose to be inoculated. All poor persons

who are not able to pay and who are desirous to being inoculated may apply. He will attend and give them medicine gratis." In spite, however, of this method of prevention which never became popular, the blast of death blew across the colony in 1769 and again in 1783 and in the latter year there were 1,100 deaths from small-pox in the city of Quebec.

Introduction of Cow-pox Vaccination

Shortly after this, however, cow-pox vaccine was introduced. Cow-pox vaccine was given the world by Edward Jenner in the year 1798. Jenner while an apprentice to a surgeon in Sodbury, England, heard a peasant woman telling his master that she could not take the small-pox because she had already had the cow-pox when she was a milkmaid; milkmaids often become infected on the hands through milking cows who are suffering from cow-pox. Hearing this, Jenner made enquiries from milkmaids and everywhere he heard the same story, "no milkmaid who had cow-pox could take small-pox." On May 4th, 1798, Jenner successfully vaccinated a boy named James Phipps with cow-pox lymph from the hand of Sarah Nelmes, a milkmaid. After waiting a few weeks he then inoculated the same boy with fresh small-pox lymph, but the boy did not take small-pox—the previous vaccination with cow-pox had protected him.

Indians' Opinion of Vaccination

In the year 1808 the Indians of Canada who had paid so terrible a toll to small-pox met in council and wrote the following letter to Jenner as an appreciation of his gift to them of cow-pox vaccination: Five Nations assembled at Fort George in Upper Canada, Nov. 8th, 1807.

"Brother:—

Our Father has delivered to us the book you sent to instruct us how to use the discovery which the Great Spirit made to you, whereby the small-pox, that fatal enemy of our tribe, may be driven from the earth. We have deposited your books in the hands of a man of skill whom our Great Father employs to attend us when sick or wounded. We shall not fail to teach our children to speak the name of Jenner and to thank the Great Spirit for the bestowing upon him so much wisdom and benevolence. We send with this a

belt and string of wampum in token of our acceptance of your precious gift, and we beseech the Great Spirit to take care of you in this world and in the land of spirits."

Establishment of Vaccine Institution

In the year 1821 the first Bureau of Vaccine was established in Canada. From this time on the history of small-pox in Canada underwent a complete change. The people seized upon this means of relief from the ravages of the disease, with the result that epidemics became a matter of history. From the year 1821 on, although cases of small-pox were frequently introduced into the colony from shipping and there were always a few cases here and there in the country, the disease lost its terror.

Tragedy Due to Neglect of Vaccination

During the years 1871-1885 vaccination was greatly neglected in the city of Montreal. At this time vaccination was done from arm-to-arm and it would appear that badly infected arms at times resulted. It was said that syphilis and tuberculosis were transmitted in this way. The people became alarmed and objected to vaccination and riots occurred in Montreal in the year 1875 and ten years later, in the year 1885. On the latter occasion the troops were called out to quell the riots. Rioting during the latter year began on the 28th of September and continued intermittently until the end of the month of October. Pamphlets were printed condemning vaccination. During these years small-pox, as one might expect, wrought considerable havoc. The deaths from small-pox in the city of Montreal during the years 1872-1880 were as follows:—

Year	Deaths
1872.....	897
1873.....	228
1874.....	647
1875.....	590
1876.....	703
1877.....	506
1878.....	728
1879.....	472
1880.....	140

Almost all of these deaths were of unvaccinated persons. The population of the city at this time was about 120,000.

Dr. J. B. Taylor, the Health Officer of the city of New York, speaking to the reporter of the "Tribune" at this time, said: "Montreal is the hot-bed of small-pox in this country." The people were led in their opposition to vaccination by a local physician and the upshot of the matter was that during these and the following years relatively few people were vaccinated, with the result that an unprotected population grew up in the city of Montreal. The soil was well prepared so that when the disease once more made its appearance in 1885 the results were disastrous. In that year a patient who was suffering from small-pox was admitted to the Hotel Dieu Hospital in Montreal and was placed in a private room with another patient. Two days after he had been discharged from the hospital a maid in the institution *who had never been in contact in any way with this patient* contracted small-pox and died. Her sister contracted the disease from her and died of hemorrhagic small-pox. The disease then spread like fire through the unprotected population, with the result that there were 3,164 deaths in Montreal during that year from the disease. Of this number, 2,717 were children under ten years of age. Once more the disease had struck. This was a costly lesson to the people, but, fortunately, they took it to heart and now in no province in Canada are the people so well vaccinated as in the Province of Quebec, with the result that small-pox has not appeared in Quebec in epidemic form since 1885.

Vaccination in Sister Province

In the sister province of Ontario where vaccination, in spite of the efforts of the Provincial Health authorities, is somewhat neglected the malignant type of small-pox still recurs in cycles of twenty years or thereabouts as it was wont to do and on each occasion it takes its toll of life. In the year 1884 in the township of Hungerford, Ontario, malignant small-pox broke out and took its toll of lives. There were two hundred and two cases and sixty-seven deaths. In 1900 malignant small-pox appeared in Port Arthur and Fort William, Ontario. In 1924 the malignant type again appeared in Ontario at Windsor and the border municipalities. The history of this epidemic is most interesting and a review of the salient features of the outbreak at this time might not be amiss.

Small-pox in Windsor and Border Municipalities

Vaccination is not compulsory in the state of Michigan, which is directly across the river from Windsor and the border municipalities, and as a result small-pox is always present in that state. There were 1,125 cases of small-pox in and about Detroit, the chief city of Michigan, in 1920. There were 846 cases in 1921, and in 1922 there were 285 cases. This gradual decrease in the number of cases was due to the increasing numbers of the population who were vaccinated during these years. In November, 1923, however, the number of cases of small-pox again began to increase and gradually cases spread across the river to Windsor and the border municipalities opposite Detroit. By the end of January there were fifteen cases in the border cities. On February 2nd, a man in Windsor developed small-pox of a malignant type which was unrecognized, although he had been examined by the best physicians. He died on the 11th of February and was buried on the 14th. In about two weeks time small-pox of a malignant type began to appear among the members of the family of the dead man and among friends who had visited him during his illness and among those who had attended the funeral. In all there were 67 cases of small-pox in Windsor and other border towns. There were 32 deaths. *All deaths were in unvaccinated persons.* As soon as the disease was recognized as small-pox the people of Windsor and the border cities flocked to the doctors to be vaccinated. *In two weeks over fifty thousand were vaccinated and the epidemic promptly subsided.*

Cutstanding Features of Outbreak

The outstanding features in connection with the Windsor outbreak are these:—

1. All deaths occurred in unvaccinated persons.
2. Seven of every ten unvaccinated persons who contracted the disease died; the mortality among unvaccinated persons being 71%.
3. One man eighty years of age who had been vaccinated sixty years before and who lived in the same house with the first man who died of malignant small-pox, developed a mild attack from which he promptly recovered.
4. The epidemic cost Windsor tax payers \$35,000.

Sanitation and Isolation Alone Do Not Eradicate Small-pox

The continued presence of small-pox in our midst shows how complex is the problem of its prevention. Sanitation and isolation do not eradicate small-pox. The most effective protection is



Courtesy of Ricketts & Byles

THE FACE OF AN UNVACCINATED CHILD
SCARRED FOR LIFE BY AN ATTACK OF CONFLUENT SMALL-POX

vaccination and the history of small-pox in Canada before and after the introduction of vaccination is proof of that assertion.

Councilman says that "the discovery of Jenner came at the most opportune time. It is impossible to overestimate the influence which it has exerted in furthering civilization and the

physical and moral advance of the human race. Without vaccination and with the present intercommunication, small-pox would be a pandemic raging over the entire world. It would certainly still the fears of those who dread an excess of population. At the present time the disease is chiefly seen in the most ignorant and wretched of the population, the strollers who do not acquire a residence so as to be subject to vaccination laws, and the criminals who evade the laws. The disease is also kept up by a class of people, who are either ignorant or who have a peculiar order of mind which renders them incapable of sane judgment and who seek in every way to oppose vaccination. The saddest feature is that in every epidemic there are a number of unvaccinated children in no way responsible, who either die of the disease or are permanently disfigured."

Preparation of Vaccine

Of late years great improvements have been made in the preparation of vaccine and we no longer see the ill effects that followed arm-to-arm vaccination years ago.

Vaccine virus is made from cow-pox inoculated in calves. Young calves that have taken nothing but milk as food are used. The animals are tuberculin tested and carefully examined for glanders, foot and mouth disease, tetanus and skin diseases. The animals are kept in clean stables, are watched to exclude any acute illness and are milk fed. Before proceeding to the operation room they are thoroughly cleansed and the part to be inoculated shaved and again cleansed with sterile water. The operator observes the same precautions as for an operation. Incisions are made along the skin that had been prepared for operation. The "seed" vaccine is then spread over the incisions and allowed to dry. By the sixth day vesicles develop over the seeded area. The skin over the vesicles is hard and firm and is thoroughly cleansed without breaking the vesicles. At this time the contents of the vesicles are collected. After the removal of the contents of the vesicles the animal is killed and the vital organs carefully examined for the presence of disease. The contents of the vesicles is mixed with glycerine and set aside for a few weeks. Glycerine kills any germs that may be present. This glycerinated lymph is put up in capillary tubes and is then ready for use. The best part of the body to vaccinate is the outer part of the arm. The site of vaccination must be cleansed

with soap and water and swabbed with alcohol. After the vaccination no dressing is necessary if the clothing is clean. If the person vaccinated is apt to be careless a small piece of gauze may be fastened over the wound in such a way that the adhesive will not be near the incision. Pads, plasters, celluloid shields should not be used as they keep the parts moist and encourage infection. The patient must be cautioned not to touch or scratch the wound as this is the cause of infected arms.

Department of Health Method of Vaccination.

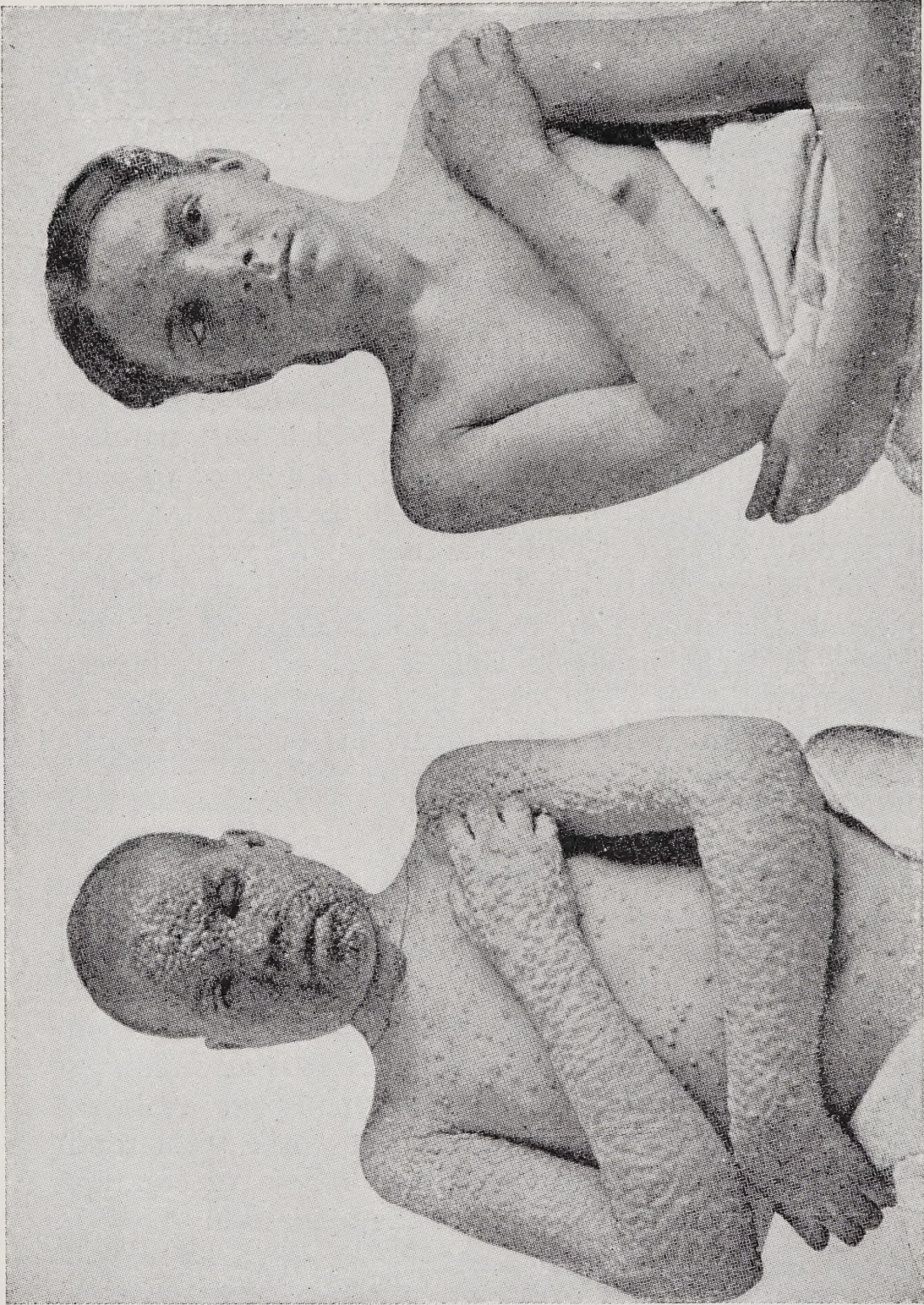
The method of vaccination that we employ in the Department of Health at Ottawa is as follows: The skin of the outer surface of the arm is thoroughly cleansed with soap and water followed by swabbing with alcohol. A drop of vaccine is then placed on the cleansed surface. A needle held almost parallel with the skin is then gently pushed through the drop of vaccine into the top layer of the skin. No blood is drawn as the true skin is not pierced. At the site of the vaccination a pearly pustule develops. This enlarges until it becomes about the size of half a five cent piece. It then dries up leaving a scar little bigger than a pea. There is slight headache and a feeling of chilliness, showing the constitutional effect. We have found this to be the most satisfactory method of performing vaccination and one that is never followed by injurious results of any kind.

Vaccination and Immunity to Small-pox

Vaccination gives an immunity to small-pox of varying degree. Jenner believed that this would last a life-time in every case. We now know that its duration varies with the individual. There is, as a rule, sufficient immunity to protect the individual from a severe attack of small-pox during life. It is advisable to repeat the vaccination during epidemics of small-pox. Millions of people are vaccinated yearly all over the world without ill result. Ulcers and other conditions which follow vaccination are due to carelessness and neglect after the operation.

Vaccination and Syphilis

Syphilis and tuberculosis which were transmitted in the arm-to-arm vaccination of other days do not occur since this method was discarded.



Courtesy of Welch & Schamberg
TWO SISTERS WHO ACQUIRED SMALL-POX FROM THE SAME SOURCE

The one on the right aged fourteen years, was successfully vaccinated in infancy; she contracted a mild varioloid. The other, unvaccinated, developed a severe small-pox, confluent on face and arms, finally recovering, although considerably pitted.

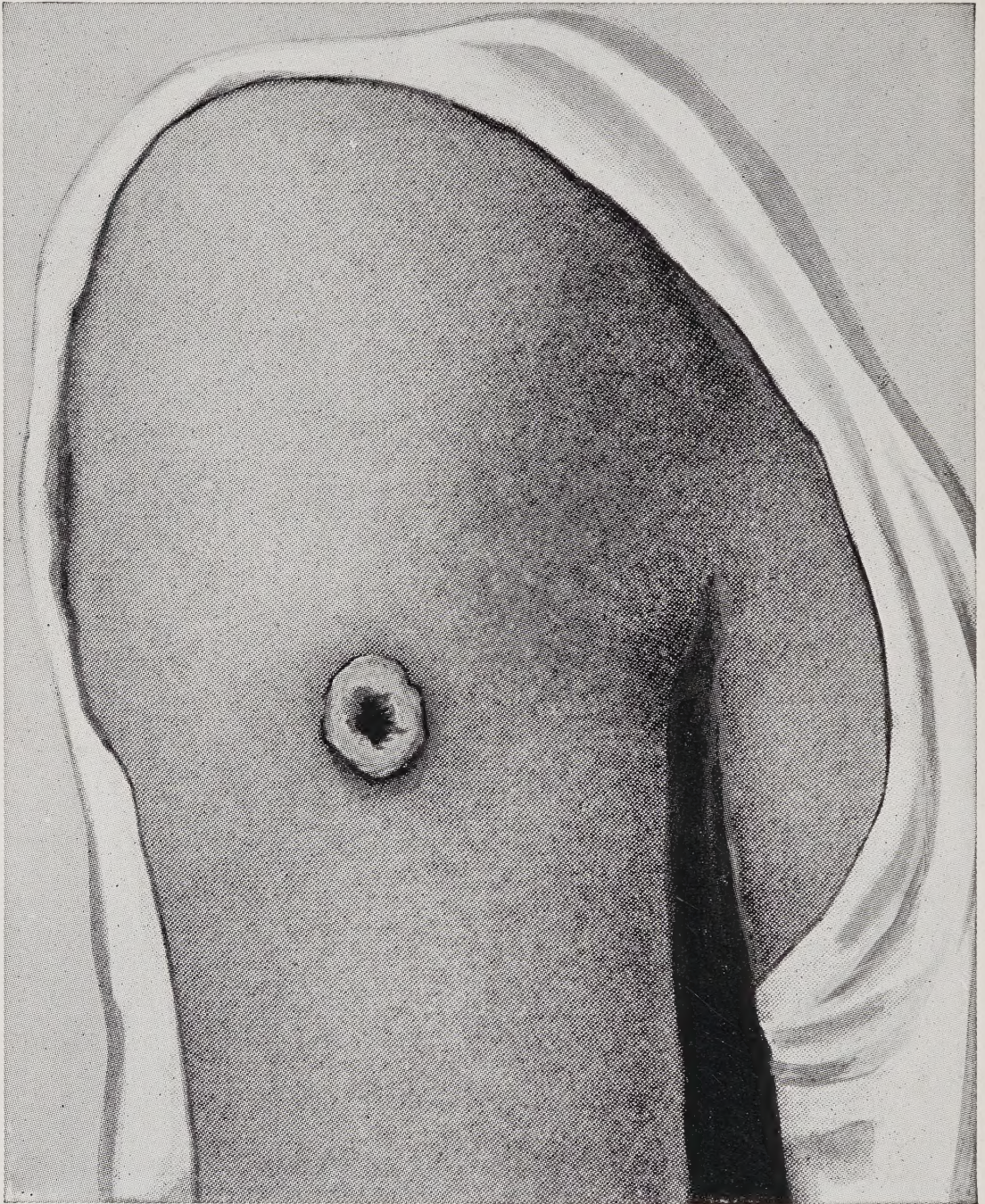


Courtesy of Welch & Schamberg

Same patients: showing appearance after recovery

Vaccination in Special Groups and During Epidemics

All soldiers, sailors, policemen, hospital, workhouse and asylum employees, nurses, doctors, mail clerks and carriers, employees of hotels, restaurants, sleeping car porters, construction



Courtesy of Welch & Schamberg

VACCINE VESICLE UPON THE SEVENTH DAY

AREOLA JUST BEGINNING

gangs, college students, especially medical students and social workers should be vaccinated. Laundry workers and undertakers should be periodically vaccinated as many of both trades have

been infected by material coming directly from undiagnosed cases of small-pox. *In times of epidemic everyone should be vaccinated as it is impossible at that time to say when and where exposure to the disease will take place and it is therefore advisable to be protected.*



Courtesy of William Hanna

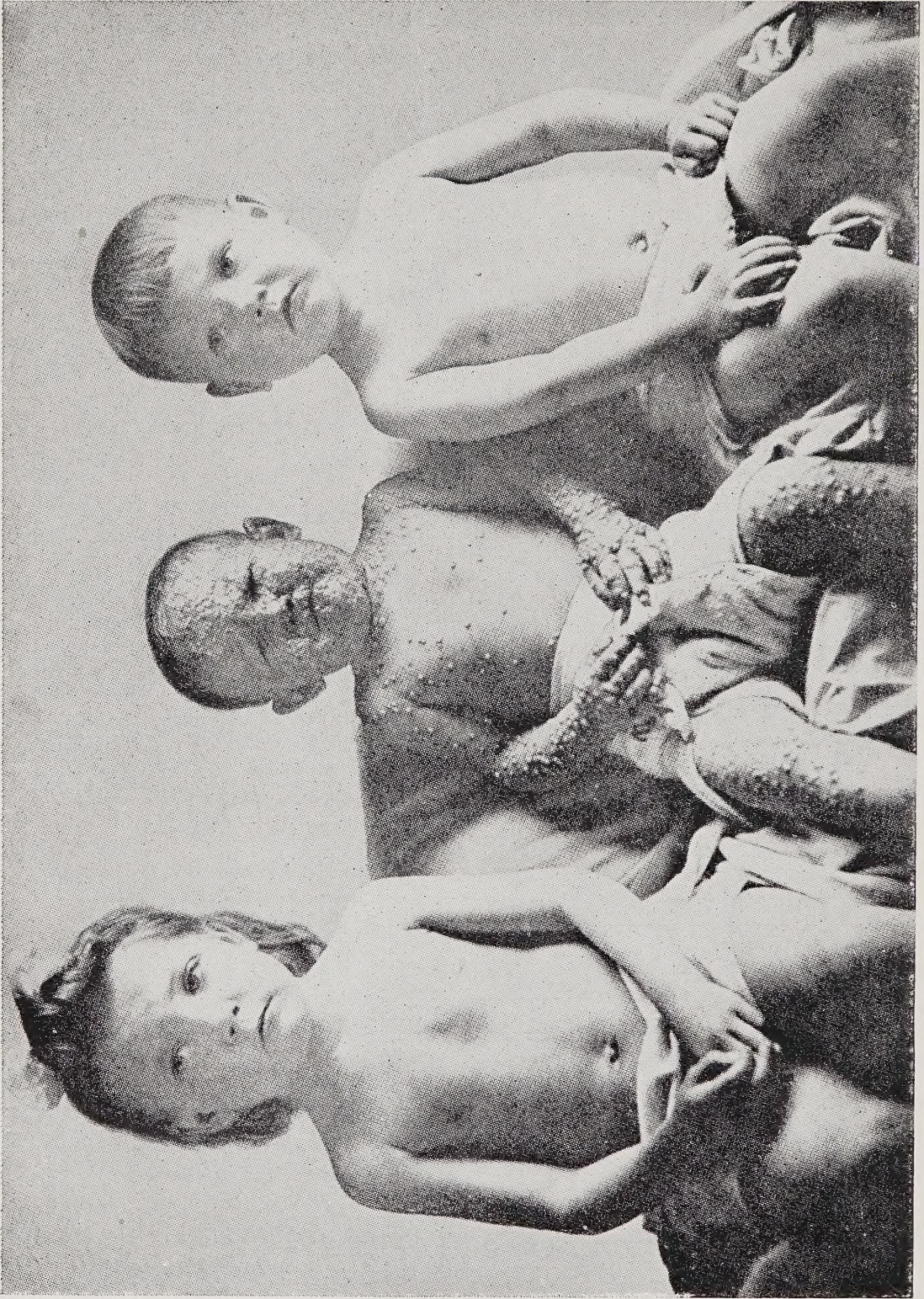
Mother suffering from small-pox with her successfully vaccinated child. No signs or symptoms of small-pox appeared in the child, which was nursed by the mother throughout her own illness in hospital.

Spread of Infection

Small-pox is spread in exactly the same way as measles and influenza and we are well aware of the fact that no amount of sanitation, hygiene of the home or personal hygiene has prevented the presence of measles and influenza in our midst. Very few children escape measles.

Prevalence of Small-pox Among Children

Before the days of vaccination small-pox was almost as prevalent among children as measles. The death rate among children from small-pox in the days before vaccination was enormous. To-day we never hear of the death of a child from small-pox. This is due solely to vaccination. Writing on May



Courtesy of Welch & Schamberg

Three members of a family brought to the Municipal Hospital with the mother, who was suffering from small-pox. The child in the centre was unvaccinated; the other two had been vaccinated the year before because of the school vaccination requirements. These two children remained in the small-pox wards several weeks and did not take small-pox.

27th, 1640, of the small-pox among the Indians in Canada, Father Hierosme Lalement, one of the early missionaries to Canada says: "We baptized more than a thousand—most of them during the malady of the small-pox which fastened itself indifferently upon all sorts of persons—a goodly number of whom went out of this world and *among them more than three hundred and sixty children under seven years—without counting more than a hundred other little children, who having been baptized in the preceding years, have been harvested by this same disease and gathered by the Angels like flowers of Paradise.*

Children and Vaccination

Children should be vaccinated between the ages of six months and two years and re-vaccinated when they begin to attend school.

Views of Investigation Committee

In conclusion it might be interesting here to quote the report of "A commission appointed to enquire into an outbreak of small-pox in the province of British Columbia under order-in-council dated October 6th, 1892." This commission drew up the following conclusion concerning vaccination:—

"In our opinion, though vaccination is not infallible—probably there is no infallible remedy or prophylactic against any disorder in the world yet IT IS SO POTENT THAT, IF UNIVERSALLY ADOPTED SMALL-POX MIGHT BE ELIMINATED FROM THE NOMENCLATURE OF EXISTING DISEASES."

